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(19)(CA) **APPLICATION FOR CANADIAN PATENT** (12)

(54) Fluorescent Tracers for Tracking Cleaner/Rinse Aid Performance

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ABSTRACT

A method of visually monitoring a surface being cleaned prior to painting is disclosed. The method comprises adding a fluorescing dye to the final rinse stage of a cleaning process, exposing the surface to ultra-violet light and observing the surface to ensure that it is clean.

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FLUORESCENT TRACERS FOR TRACKING CLEANER/RINSE AID PERFORMANCE

FIELD OF THE INVENTION

The present invention relates to processes for tracking the performance of cleaners and rinses in the metal and plastic coating arts. Fluorescent tracers are added to cleaners and/or final rinses to allow visual verification of the absence of the cleaner or rinse on the surface being treated.

BACKGROUND OF THE INVENTION

In the manufacturing of assembled components whether metal or plastic, prior to painting, cleaning and/or rinsing operations are generally required. For example, in the automotive industry, formed plastic parts which are painted must first be cleaned to remove contaminants from the surface. The most common contaminants that must be removed before painting are mold release agents, shop soil, material handling soil, machining soils, fingerprints and plastic sanding dust. These contaminants are removed by chemical means such as detergent-based, acid-based or alkaline based cleaners. Similarly, metal parts must be cleaned prior to

painting, plating or other such processes. Contaminants such as shop soil, material handling soil, machining soil, fingerprints and dust must be removed.

The processes of cleaning such parts generally typically include, at least, a wash stage, a rinse stage and a final rinse stage. The parts can be either spray washed or immersed in the cleaner. In some cases the wash and rinse may be in the same stage. In other cases, seven or more stages may be employed: pre-rinse, alkaline clean, rinse, acid clean, rinse, recirculating DI rinse, virgin DI rinse. When the parts are to be painted, the cleaning operation is typically performed in a production line with the freshly cleaned parts sequentially conveyed into a paint booth. Problems can occur, however, when the freshly cleaned parts are not fully dry or the parts dry with water spots on them. This can lead to "spotting" upon painting and will result in an imperfect paint job. This requires stripping of the part and/or an additional painting procedure.

Further, when a bead of water dries on the surface, ionic salts such as Cl, Ca, Mg and K will remain on the surface of the part. After the part has been painted, there will be a visual defect caused by such spots. Exposure to humidity which can cause increased water sensitivity can lead to blistering of the paint. Adhesion problems can also result.

The effective removal of aqueous rinse water or surface treatments from the surface of the parts typically requires a drainage enhancing solution which will effectively aid drying of the parts to be painted. The present inventor has discovered a method of visually determining the presence or absence of aqueous rinse on the surface of the parts. The method of the present invention can be easily integrated into a production line operation. The method allows for the simple, visual assessment of

the efficacy of the removal of aqueous treatments and/or rinses from surfaces of the parts being treated. This allows detection of parts which are not clean and dry prior to painting. Thus, parts which can result in poor paint quality can be identified and reprocessed prior to painting. The method of the present invention provides for easy detection of water spots as well as dried spots, either of which can adversely affect a coating applied to the part.

SUMMARY OF THE INVENTION

The present invention provides a method for visually monitoring the performance of the cleaning and rinsing of metal or plastic parts. The method of the present invention involves incorporating a fluorescent dye (UV or black light sensitive) into the aqueous solutions used for the final stage of treatment of a cleaning/washing system. By strategically placing an ultraviolet lamp or black light after the final stage, the efficacy of the cleaning and water removal after the rinse stage can be visually detected. The inspection under ultraviolet light can occur after any fluorescent dye treatment clean/rinse stage or before or after any drying stages.

The method of the present invention relates to the final appearance of a part before it goes to a dry off oven (if one is used) and prior to being painted. Sheeting action, often chemically enhanced, in the very last stage minimizes the chances for water spot formation. However, prior to the present invention there was no way to quickly, visually confirm the cleanliness of the part prior to painting. The use of fluorescent tracer dyes is known in the automotive industry for leak detection. It is believed that the present inventor is the first to use such dyes for cleanliness detection.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention provides for the visual verification of the efficacy of a cleaning and drying operation of metal or plastic parts prior to painting. The method of the present invention involves incorporating a fluorescent dye into the final rinse operation of a surface cleaning system. By placing an ultraviolet lamp after the rinse stage, a lack of water sheeting can be visually detected. The ultraviolet lamp is placed after the final rinse stage but before painting. The lamp can be placed before or after drying operations. The fluorescent dye will be visible under the ultraviolet lamp in water left on the part or in dried water spots left on the part.

In the cleaning of metal and plastic surfaces prior to painting a final aqueous rinse stage which forms a "water break free" surface by sheeting out is desired. The sheeting of the final rinse is desired so that water drops or dried water spots which could adversely affect a paint applied to the surface do not form. Often, commercial products which promote the sheeting action so that the parts dry uniformly without water spots or rings are added to the water rinses of a cleaning and rinsing operation. The fluorescent materials of the present invention are compatible with such rinse aids.

In the method of the present invention, a fluorescent dye is incorporated into the treatment of the final stages of a cleaning and rinsing operation. The fluorescent dye allows for a visual inspection, under ultraviolet light, to quickly and easily determine the "cleanliness" of the surface prior to painting. Thus, detection of water spots or dried water spots on the parts prior to painting minimizes water spot related paint failures or problems.

The fluorescent dye employed in the method of the present invention is a water soluble material which fluoresces when exposed to ultraviolet light. Such fluorescent materials are commercially available such as Tinopal CBS-X, Tinopal CBS-44, and Tinopal SFP, aromatic sulfonates available from Ciba-Geigy. The fluorescent dye is preferably added to the final rinse stage of a cleaning and washing system in concentrations of from about 0.1 ppm to 25 ppm and preferably from about 1.0 ppm to 5 ppm.

The present invention will now be described with reference to a number of specific examples which are to be regarded solely as illustrative, and not as restricting the scope of the invention.

The efficacy of the present invention was evidenced by dipping GE Pulse® (a plastic alloy of polycarbonate and ABS) pieces into tap water and a commercial, modified polyethoxylated straight chain alcohol plastic rinse aid (HPC-10 available from Betz Laboratories, Inc. of Trevose, PA) in water. Both treatments included an aromatic sulfonate fluorescent material available as Tinopal CBS-X from Ciba-Geigy. Upon dipping the plastic pieces into these two solutions, it was observed that the parts dipped in water with fluorescent dye had water beads which fluoresced when exposed to an ultraviolet light source. On the parts dipped in the aqueous rinse aid treated with a fluorescent dye, the water sheeted to a thin water break free layer and no fluorescence was observed when exposed to an ultraviolet light source.

While the present invention has been described with respect to particular embodiments thereof, it is apparent that numerous other forms and modifications of the invention will be obvious to those skilled in the art. The appended claims and this invention generally should be construed to cover all such obvious forms and modifications which are within the true spirit and scope of the present invention.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A process for visually monitoring the presence or absence of an aqueous solution on a surface which comprises:

a) adding a fluorescing dye to an aqueous solution;
b) contacting a surface with said aqueous solution;
c) thereafter exposing said surface to an ultraviolet light source; and
d) observing said surface.

2. The process of claim 1 wherein said aqueous solution is an aqueous rinse aid solution.

3. The process of claim 1 wherein said surface is observed prior to drying.

4. The process of claim 1 wherein said surface is observed subsequent to drying.

5. A process for visually monitoring the sheeting action of an aqueous treatment solution on a surface comprising:

a) adding a fluorescing dye to an aqueous treatment solution;
b) contacting a surface with said aqueous surface treatment solution;
c) thereafter exposing said surface to an ultraviolet light source; and
d) observing said surface for fluorescence.

6. The process of claim 5 wherein said aqueous treatment solution is a rinse aid solution.

7. The process of claim 5 wherein said surface is observed prior to drying.

8. The process of claim 5 wherein said surface is observed subsequent to drying.